AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (Previously Presented) A method of etching a dielectric layer with selectivity to an underlying stop layer, comprising:

supporting a semiconductor substrate in a plasma etch chamber of a plasma etch reactor, wherein the plasma etch reactor is a capacitively coupled plasma reactor having a powered showerhead electrode and/or a powered bottom electrode, the substrate including a dielectric layer over a stop layer;

supplying an etchant gas to the plasma etch chamber with the showerhead electrode; and

etching openings in the dielectric layer by energizing the etchant gas into a plasma state by capacitively coupling RF energy into the plasma etch chamber, the etchant gas comprising a hydrogen-free fluorocarbon gas represented by C_xF_y gas wherein $y/x \leq 1.5$, an oxygen-containing gas and optional carrier gas,

wherein the plasma etch reactor comprises a dual frequency capacitively coupled plasma reactor and RF energy is supplied at two different frequencies to either the bottom electrode or at different first and second frequencies to the showerhead electrode and bottom electrode, and

wherein the pressure in the plasma etch reactor is 50 to 100 mTorr and temperature of the substrate support is +20°C to +60°C.

2. (Previously Presented) The method of Claim 1, wherein the openings comprise vias, contacts, and/or trenches of a dual damascene structure, a self-aligned contact structure or self-aligned trench structure and the showerhead electrode is supplied 0 to 3000 watts of RF energy and the bottom electrode is supplied 0 to 3000 watts of RF energy.

3. (Previously Presented) The method of Claim 1, wherein the stop layer is silicon nitride and the etch rate selectivity of the dielectric to the silicon nitride is at least 10.

4. (Previously Presented) The method of Claim 1, wherein the dielectric layer comprises a doped or undoped silicon oxide layer or low-k material and the stop layer comprises a silicon nitride layer.

5. (Canceled)

6. (Canceled)

7. (Previously Presented) The method of Claim 1, wherein the etchant gas is nitrogen-free, the C_xF_y gas is at least C_4F_6, the oxygen containing gas is at least O_2 and the carrier gas is Ar, the etchant gas being supplied to the plasma etch reactor through the showerhead electrode at flow rates of 2 to 50 sccm C_4F_6, 2 to 50 sccm O_2 and 50 to 800 sccm Ar.

8. (Previously Presented) The method of Claim 1, wherein the C_xF_y gas is at least C_4F_6, the oxygen containing gas is at least O_2 and the carrier gas is Ar, the etchant gas being supplied to the plasma etch reactor through the showerhead electrode at flow rates of 10 to 25 sccm C_4F_6, 5 to 20 sccm O_2 and 50 to 300 sccm Ar.

9. (Original) The method of Claim 1, wherein a ratio of flow rates of the C_xF_y to oxygen containing reactant is 0.5:1 to 5:1.

10. (Original) The method of Claim 1, wherein a ratio of flow rates of the C_xF_y to oxygen containing reactant is 1:1 to 2:1.

11. (Previously Presented) The method of Claim 1, wherein the dual frequency capacitively coupled plasma reactor is operated with a top electrode power of 200 to 3000 W and a bottom electrode power of 50 to 3000 W for etching the openings.

12. (Previously Presented) The method of Claim 1, wherein the dual frequency capacitively coupled plasma reactor is operated with a top electrode power of 1000 to 2000 W, and a bottom electrode power of 1000 to 2000 W for etching the openings.

13. (Canceled)

14. (Original) The method of Claim 1, wherein the etchant gas includes CO supplied to the plasma etch reactor at a rate of 50 to 500 sccm CO.

15. (Original) The method of Claim 1, wherein the C_xF_y is either C_4F_6 or C_6F_6.

16. (Original) The method of Claim 1, wherein the C_xF_y is C_4F_6 and the oxygen containing gas is O_2, the C_4F_6 and O_2 being supplied to the plasma etch reactor at flow rates having a ratio of C_4F_6:O_2 of 0.5:1 to 5:1.

17. (Original) The method of Claim 1, wherein the C_xF_y is C_4F_6 and the oxygen containing gas is O_2, the C_4F_6 and O_2 being supplied to the plasma etch reactor at flow rates having a ratio of C_4F_6:O_2 of 1:1 to 2:1.

18. (Original) The method of Claim 1, wherein the C_xF_y is C_4F_6 and the oxygen containing gas is supplied to the plasma etch chamber in an amount sufficient to avoid etch stop during etching of the openings.

19. (Previously Presented) The method of Claim 1, wherein the etched openings open onto flat and corner portions of the stop layer, the dielectric layer comprises BPSG and the stop layer comprises silicon nitride, the etch rate selectivity of the BPSG to the flat and corner portions of the silicon nitride being at least 15.

20. (Original) The method of Claim 1, wherein the dielectric layer comprises BPSG and the stop layer comprises silicon nitride, the C_xF_y gas being C_4F_6 and the oxygen containing gas being O_2, the C_4F_6 and O_2 being supplied to the plasma etch reactor at flow rates having a ratio of O_2:C_4F_6 of 0.5 to 1.2.

21. (Previously Presented) The method of Claim 1, wherein the etch rate selectivity of the dielectric to the stop layer is greater than 30:1.

22. (Previously Presented) The method of Claim 1, wherein the etching of the dielectric layer is carried out in a single step.

23. (Previously Presented) The method of Claim 1, wherein the etchant gas is hydrogen-free.

24. (Previously Presented) A method of etching a dielectric layer with selectivity to an underlying stop layer, comprising:

supporting a semiconductor substrate in a plasma etch reactor, wherein the plasma etch reactor is a capacitively coupled plasma reactor having a powered showerhead electrode and/or a powered bottom electrode, the substrate including a dielectric layer over a stop layer;

supplying an etchant gas to the plasma etch chamber; and

etching openings in the dielectric layer by energizing the etchant gas into a plasma state, the etchant gas consists essentially of a hydrogen-free fluorocarbon

gas represented by C_xF_y gas wherein $y/x \leq 1.5$, an oxygen-containing gas and optional carrier gas,

wherein the plasma etch reactor comprises a dual frequency capacitively coupled plasma reactor and RF energy is supplied at two different frequencies to either the bottom electrode or at different first and second frequencies to the showerhead electrode and bottom electrode, and

wherein the pressure in the plasma etch reactor is 50 to 100 mTorr and temperature of the substrate support is +20°C to +60°C.

25. (Previously Presented) A method of etching a dielectric layer with selectivity to an underlying stop layer, comprising:

supporting a semiconductor substrate in a plasma etch reactor, wherein the plasma etch reactor is a capacitively coupled plasma reactor having a powered showerhead electrode and/or a powered bottom electrode, the substrate including a dielectric layer over a stop layer;

supplying an etchant gas to the plasma etch chamber; and

etching openings in the dielectric layer by energizing the etchant gas into a plasma state, the etchant gas consists of a hydrogen-free fluorocarbon gas represented by C_xF_y gas wherein $y/x \leq 1.5$, an oxygen-containing gas and optional carrier gas,

wherein the plasma etch reactor comprises a dual frequency capacitively coupled plasma reactor and RF energy is supplied at two different frequencies to either the bottom electrode or at different first and second frequencies to the showerhead electrode and bottom electrode, and

wherein the pressure in the plasma etch reactor is 50 to 100 mTorr and temperature of the substrate support is +20°C to +60°C.

26. (Previously Presented) The method of Claim 1, wherein the etchant gas is free of hydrogen-containing fluorocarbon gas.

27. (Previously Presented) The method of Claim 1, wherein the etchant gas is free of fluorocarbon gas represented by C_xF_y, wherein $y/x > 1.5$.